HST
Hubble Space Telescope

Mission Objective
The primary objectives of the Rubble Space Telescope (HST) are to: 1) investigate the constitution, physical characteristics, and dynamics of celestial bodies; 2) determine the nature of processes occurring in stellar and galactic objects; 3) study the history and evolution of the universe; 4) confirm universality of physical laws; and 5) provide a long-term space research facility for optical astronomy.

TYPE OF MISSION	PROGRAM OFFICE	PROJECT LEAD CENTER	MANAGEMENT APPROACH	S/C CONTRACTOR	I&T CONTRACTOR
ASTROPHYSICS	SPACE SCIENCE	MSFC	IN-HOUSE	LMSC	LMSC

Payload Description
The Rubble Space Telescope (HST) payload includes an Optical Telescope Assembly (OTA), five focal plane instruments and a spacecraft which is called the Support System Module (SSM). The OTA is a 2.4-meter Ritchey-Chretien mirror configuration supported by optical, structural, thermal, performance control, and fine guidance subsystems. The five focal plane instruments include a photometer, two spectrographs and two field cameras. The SSM provides structural support, thermal control, electrical power, communications, data management, and pointing control to support the OTA and the focal plane instruments. Two solar arrays affixed externally to the SSM at the forward shell provide electrical power. A battery protection and reconditioning circuit (BPRC) provides battery protection by ensuring that no cell is reversed during reconditioning. The S-band communications is accomplished through two Low-gain conical spiral antennas and one High-gain parabolic antenna. Repair and/or replacement of components will be accomplished either by return of the HST to the ground, or by astronauts performing in-orbit maintenance.

INSTRUMENT NAME	ACRONYM	PI AFFILIATION	PRINCIPAL INVESTIGATOR	I&T CONTRACTOR
FAINT OBJECT CAMERA	FOC	ST SCIENCE INST	F. D. MACCHETTO	ESA
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FAINT OBJECT SPECTROGRAPH	FOS	USCD	R. HARMS	MARTIN-MARIETTA
HIGH RESOLUTION SPECTROGRAPH	HRS	MSFC	J. C. BRANDT	BASD
HIGH SPEED PHOTOMETER	HSP	UNIV WISCONSIN	R. C. BLESS	UNIV WISCONSIN
OPTICAL TELESCOPE ASSEMBLY	OTA	N/A	NONE	PERKIN-ELMER
WIDE FIELD PLANETARY CAMERA	WFPC	CIT	J. A. WESTPHAL	JPL

Instrument Descriptions
The HST Faint Object Camera (FOC) utilizes the spatial resolution of the HST to make images of very faint celestial objects and to perform spectroscopy of light sources in the wave length range from 120 to 700 nanometers. The FOC includes two independent cameras, f/48 and f/96, and provides a dynamic range for point sources from 15 to 29 mv. The FOC scientific objectives are to: 1) study extremely faint objects by use of an image photon counting tube with a field-of-view (FOV) resolution of 100,000 pixels; 2) study faint structures near bright sources using occulting and apodizing masks (a coronograph) to cover the brighter object; and 3) study structures of relatively bright objects using attenuating filters to extend the dynamic range of the FOC detectors.
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The HST High Resolution Spectrograph (HRS), Data Point 626, is designed and built by MSFC and BASD to obtain high resolution spectrometric observations of various phenomena in the Galaxy and the Universe. The HRS uses plane and Echelle gratings as well as two photon counting digicon detectors and four calibration lamps. The instrument is a Czerny- type supported by a graphite epoxy optical bench.
The HST High Speed Photometer (HSP), Data Point 619, is designed and built by the University of Wisconsin to provide photometric observations in the 1150 and 6500 angstrom region. The instrument has no moving mechanical parts and relies on the spacecraft to direct light to one of approximately 100 combinations of spectral filters and entrance apertures. The instrument uses four magnetically focused image dissectors whose photocathode surface is subdivided into approximately 25 areas, corresponding to the 25 apertures of the Optical Telescope Assembly. This makes each image dissection equivalent to 25 individual single channel photometers.
The HST Optical Telescope Assembly (OTA), Data Point 644, is a 2.4 meter Cassegrain telescope designed by PerkinElmer. Besides the optics and the structure, the telescope assembly has a fine guidance system and an optical control system that allows pointing with an extremely high accuracy. The OTA is designed so that various subsystems (electronics, pointing sensors, etc.) are orbit replaceable. Electronic heaters maintain a constant temperature of 70 degrees F.
The HST Wide Field and Planetary Camera (WFPC), Data Point 694, is designed and built by JPL. It consists of two cameras housed in a single radial bay. In the wide-field mode at f/12.9, the WF/PC provides a field of view of 2.67 by 2.67 arc minutes for studying galaxies, clusters of galaxies and the spatial distribution of faint quasars. In the planetary mode at f/30, the field of view is 68.7 by 68.7 arc-sec to provide full-disc images of the planets where high angular resolution and extreme red-light sensitivity are needed. Both cameras utilize four CCDs as detectors, with each CCD having 800 x 800 picture elements.

Launch
4/24/90